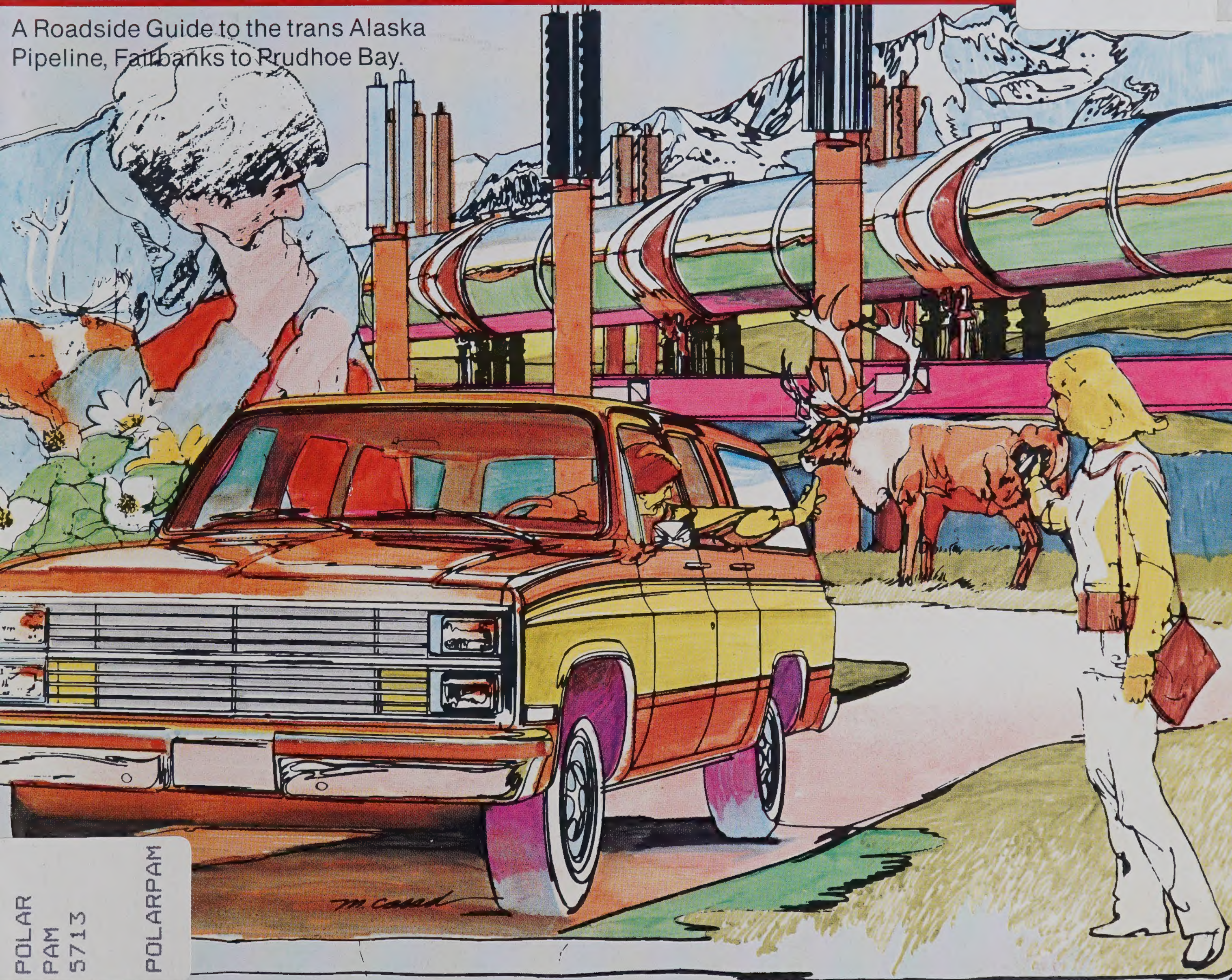
# PIPELINE DRIVE NORTH

A Roadside Guide to the trans Alaska Pipeline, Fairbanks to Prudhoe Bay.



POLAR
PAM
5713
POLARPAM

# About This Guide

The trans Alaska pipeline extends nearly 800 miles, from Prudhoe Bay on the Arctic Ocean to Valdez on Prince William Sound. The 415-mile James Dalton Highway generally parallels the northernmost portion of the line.

The drive north along the Dalton Highway to Prudhoe Bay is both beautiful and interesting, with wildlife, panoramic scenery, and geological formations to see and enjoy. The Highway was built by Alyeska Pipeline Service Company, as part of the trans Alaska pipeline project. Once known simply as the North Slope Haul Road, the Highway was used to transport supplies and equipment for the construction project. The Highway was built under an agreement with the State of Alaska, which now owns and maintains the road, and has given it its present name, in honor of James William Dalton.

Son of a pioneer who came to Alaska in 1882, James Dalton grew up in Cordova and attended the University of Alaska at Fairbanks, graduating in 1937 with a degree in mining engineering. He worked for several gold-mining operations, and as an engineer on construction projects in interior Alaska.

During World War II, the Navy began a search for oil in the Alaskan arctic's Naval Petroleum Reserve #4. The engineering and construction arm of the Navy — the Seabees — was assigned to the search. Dalton joined the Seabees, but was sent to Dutch Harbor (and, later, Hawaii) instead of the arctic. After the war, he joined the arctic exploration program as a civilian engineer; and in 1964, he was asked by the Defense Department to supervise construction of the Distant Early Warning (DEW) Line in Alaska.

Dalton worked for the rest of his career as an expert in arctic engineering and logistics problems, acting as a consultant in many of the early oil exploration efforts on the North Slope. In conducting overland expeditions to supply remote sites, he staked thousands of miles of winter trails across the wilderness, from the Canadian border to the Bering Sea, and from the Beaufort Sea to the Brooks Range. It is, therefore, particularly appropriate that the first road in Alaska to cross the Arctic Circle should bear his name.

In this guide, interesting features along the James Dalton Highway are indicated in distances measured by mileposts (MP). Most Alaskan highways are marked at one-mile intervals by numbered mileposts. These markers, placed by the State of Alaska, can be regarded as accurate mileage guides — but mileposts may not yet be installed at all locations on the Dalton Highway. Where you see no actual mileposts, use your vehicle's mileage meter, measuring from recognizable major landmarks.

Mileage is reckoned from south to north in this guide, beginning at the start of the James Dalton Highway, about four miles beyond Livengood — Mile 0. Thus MP 56, the first milepost entry in the guide, is 56 miles north of the Highway's starting point; MP 156.4 refers to a point 156 and four-tenths miles from the start, and so on.

---

Public access to the gravel-surfaced Highway has been restricted to the summer months only, and to the portion of the road south of the Brooks Range. It would, therefore, be prudent to consult the Statewide Maintenance and Operations office, State of Alaska Department of Transportation and Public Facilities, 452-1911, about current public-access limitations, or 456-7623, for 24-hour recorded road conditions.

# A Few Words of Caution

There are litter barrels 🛢 and rest facilities 🚻 located along the road. RV waste receptacles are located at MP56 and MP179. More elaborate facilities for motorists are available only at two locations along the highway.

At milepost 56, Yukon Ventures Alaska offers diesel fuel, gasoline and propane; car, truck and tire repair; towing service, small grocery store, radiotelephone, food and lodging. For further information contact Yukon Ventures Alaska, Suite 105, 455 3rd Ave., Box 137, Fairbanks, AK 99701, or call Radio Fairbanks, 452-1166, "radio unit 7426."

At milepost 173.6, Coldfoot Services is open 24 hours a day, year-round, and provides diesel fuel, gasoline, unleaded fuel, jet fuel, and propane; car, truck and tire repair; towing service, showers, food, lodging, Post Office, a small grocery store and radiotelephone. For further information write Coldfoot Services, Coldfoot, Alaska 99701.

## A Few Words of Caution

Keep your headlights on at all times. If you stop for any reason along the Highway, pull well off the roadway and leave your warning lights flashing — many large trucks use this route. Carry basic survival gear regardless of the season, since this region is still largely uninhabited.

Avoid close contact with wildlife. Small animals, such as foxes, may be rabid; encounters with large ones, like bear or moose, can be literally lethal — particularly when their young are nearby.

At this time, fuel is available north of the Yukon River only at milepost 175. Other services may not be available at all. Therefore, motorists should be prepared to deal with flat tires and other vehicle mechanical problems which may occur.

But please understand that Alyeska Pipeline Service Company cannot assist you if you have car trouble, and can provide no services of any kind to travelers. The Department of Transportation or the Alaska State Troopers can tell you in advance what to do in case of emergency.

And, for your own safety, please keep away from the pipeline.

Rec'd: MAY 13 1987
Order No.:
Price: Free
Acc. No.:

BOREAL INSTITUTE
LIBRARY

# History

The construction of the James Dalton Highway, then called the North Slope Haul Road, was a remarkable feat of engineering — and of human determination. Construction began on April 29, 1974, and was completed on September 29, 1974 — just 154 days. It took 32 million cubic yards of gravel, more than three million man-hours of construction effort, and $125 million.

In 1975, the Yukon River Bridge was opened, ending the use of barges, hovercraft, and winter ice-bridges in crossing the great river. Twenty permanent bridges were constructed along the Highway.

The first mainline pipe section of the trans Alaska pipeline was installed in the Tonsina River, north of Valdez, in March of 1975. Twenty-nine construction camps — from Pump Station 1 at Prudhoe Bay to the Marine Terminal at Valdez — housed workers during the construction of the line. Employment peaked at 21,600 in August of the same year.

By the end of 1976, most of the work had been completed. By May of 1977, all 800 miles of pipe had been installed and tested. The final weld on the mainline pipe took place May 31, 1977, at Pump Station 3. And on June 20, the first North Slope crude oil entered the pipeline at Pump Station 1.

On July 28, the first load of oil reached the Marine Terminal, and headed south aboard the oil tanker ARCO *Juneau* on August 1, 1977. On January 11, 1985 the 5,000th tanker entered Prince William Sound, and departed with cargoes of crude, bound for U.S. refineries. Since the Kuparuk oil field on the North Slope began producing in 1981, joining the Prudhoe Bay field, the total throughput of the pipeline has averaged 1.7 million barrels per day.

In October of 1979, the North Slope Haul Road was turned over to the State of Alaska, and was later renamed after James Dalton. Today, the road serves as a link with pump stations and the Slope for industrial truck traffic, as well as limited personal traffic.

# The Pipeline

The trans Alaska pipeline is unique among the many pipelines of the world. Most such oil lines are buried. But much of Alaska is underlain by permanently-frozen soil, or permafrost. Pipeline planners realized that heat from the oil — which comes out of the ground at 150 - 180 degrees Fahrenheit and enters the line at 145 °F — would thaw the frozen soil if the pipeline were buried — a highly undesirable effect. In frozen silt or solid ice, for instance, thawing could cause the ground to slump or slowly erode, resulting in an unstable pipeline foundation, not to mention the possible ecological damage.

So more than half of the trans Alaska pipeline's 800-mile length is above ground. The 48-inch diameter pipe is insulated and elevated on special pipe supports, each consisting of two vertical supports of steel, and a connecting crossbeam. Thawing around the vertical supports, in the most sensitive soil areas, is prevented by thermal devices called heat pipes, which carry heat up through pipes within the supports to finned radiators on top. In some areas — especially regions of extreme winter cold, in the north — heat pipes aren't necessary, and the vertical supports lack the finned radiators.

Approximately 420 miles of the pipeline, in segments of various length, are built above ground. A zig-zag configuration is apparent in the elevated portions of the line, contributing to flexibility.

In these above-ground segments, supports are located about every 60 feet. The pipe is free to move on the crossbeams of the supports, in case of expansion or contraction — from temperature variation, for instance, or earthquakes. Every 800 to 1,000 feet, the pipe is held firmly by "anchors," to prevent uncontrolled movement. These anchors are readily identifiable by the four closely-spaced vertical supports on which they rest.

Permafrost does not occur in all of Alaska; nor does it always become unstable when thawed. Solid rock and well-drained gravels are examples of frozen soils which may remain stable if thawed. In such areas, and in regions where permafrost does not occur at all, the pipeline was buried in the conventional manner.

About 380 miles of the pipeline are buried, in stretches of varying lengths. The pipe is bedded in a deep ditch, insulated with gravel padding, and covered with dirt. In a few areas, where potentially thaw-unstable soils were present but burial was necessary to accommodate road or wildlife crossings, the buried line is refrigerated to prevent thawing.

The pump stations provide the power to drive the oil through the pipeline. At the line's Marine Terminal in Valdez, the oil is received, metered, and loaded aboard tankers for the journey to U.S. refineries. The entire pipeline can be monitored and operated from the Operations Control Center at the Terminal.

Most outstanding features of the pipeline — excluding the Terminal, which is far to the south — will be visible as you drive along the James Dalton Highway.

Enjoy your trip!

# Points of Interest

### MP 0

The James Dalton Highway begins approximately four miles beyond the small community of Livengood. The terrain for the next several miles is heavily forested, with rolling hills. The pipeline is periodically visible near the road, where the line is elevated in areas of ice-rich permafrost.

### MP 56

The Yukon River Bridge. Costing more than $30 million to construct, this bridge is 2,290 feet long and 30 feet wide. Built in 1974 and 1975, it was first opened to the public in 1979. The pipeline is supported along the east side of the bridge. The Alaska State Legislature in 1982 named this the E.L. Patton Yukon River Bridge. Mr. Patton was President of the pipeline company during design and construction of the pipeline. The bridge was built by the State of Alaska, with the pipeline builders sharing the cost.

### MP 110

A view is possible from here of the Kanuti River Valley, a traditional wintering ground for migratory arctic caribou. The valley offers relative shelter from winter winds, and sufficient graze.

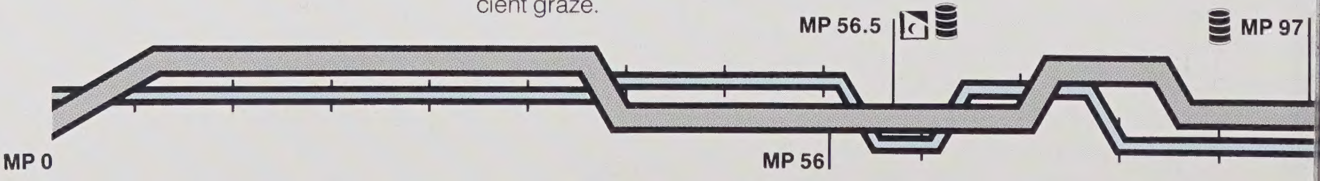
### MP 115.3

Latitude 66° 33′ — the Arctic Circle.

### MP 135.1

Pump Station 5. This is the first pipeline facility north of the Yukon River. Strictly speaking, however, it is not a pump station at all. Unlike other pump stations, PS 5 is a "drain-down," or pressure relief, station only. At present, with the pipeline's average daily throughput at 1.6 million barrels, PS 5 is not needed to move oil through the line, so no pumps have been installed here. The facility is necessary at this location to relieve pressure in the pipeline if it should be shut down. If this happens, some of the oil in the line is temporarily diverted to relief tanks at the station, and reinjected when the pipeline is started up again.

A communications tower is visible above the facility. This microwave tower represents the heart of the communications system that links pump stations with the Operations Control Center at the Marine Terminal. The system of microwave towers generally parallels the pipeline route, and is backed up by a satellite communications network.



**MP 145.6**

From this point, when visibility is good, you may be able to see the Brooks Mountain Range. Named in 1925 for Alfred Hulse Brooks, Chief Geologist with the U.S. Geological Survey from 1903 to 1924, the Brooks Range is part of the Rocky Mountain system.

**MP 156.4**

The South Fork of the Koyukuk River. The pipeline crosses the river on a plate-girder bridge. The final link-up of the North Slope Haul Road took place here on September 29, 1974, completing the first road to the Arctic coast. A few hundred construction workers and dignitaries attended ceremonies here to celebrate completion of the road.

The lower reaches of the Koyukuk River were explored between 1842 and 1884 by Lt. Zagoskin of the Imperial Russian Navy; and in 1885, Lt. Henry Tureman Allen of the U.S. Army explored the entire river.

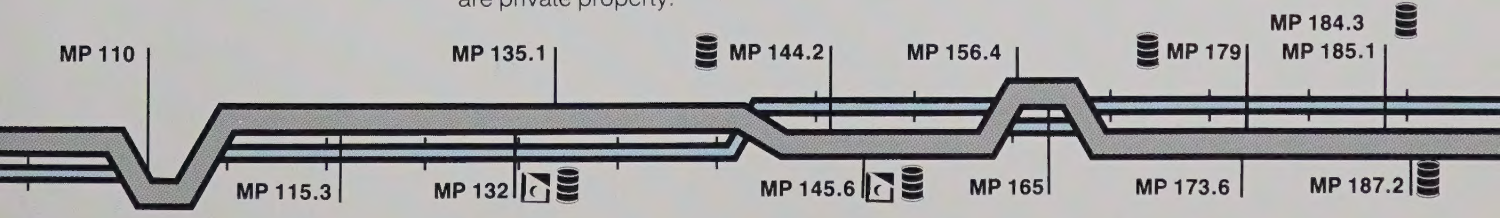
**MP 173.6**

The turnoff to Coldfoot. There was once a flourishing mining camp at the mouth of Slate Creek, on the east bank of the Middle Fork of the Koyukuk River. Legend has it that Coldfoot — originally named after the creek — received its present name in 1900, when gold stampeders came this far north, got cold feet, and turned back. The town's old cemetery still remains, mute witness to a colorful period long past. Diesel fuel and gasoline are available, as are meals, lodging, showers, radiotelephone, auto repair and towing service.

You are now in the Brooks Range. The road offers breathtaking scenery, — and keep watch for wildlife, especially mountain sheep, on the hillsides.

**MP 185.1**

The historic town of Wiseman can be seen to the west, across the Koyukuk River. When gold was discovered on Nolan and Wiseman Creeks near here in 1911, many miners migrated from Coldfoot and elsewhere. A few residents still live in Wiseman all year, and others come for the summer. Gold is still mined in the area. All buildings in Wiseman are private property.



## MP 206.6

To the east, you can see two impressive granite monoliths from here — Wiehl and Sukakpak Mountains. There is also a view of Atigun Pass from this point. Construction of the pipeline took on some unusual — and challenging — aspects in the pass. Because of the double problem of avalanche danger and potentially thaw-unstable soil, a special insulated burial mode had to be used.

Here the Highway crosses the Dietrich River, which flows south 35 miles to join the Bettles River, forming the Middle Fork of the Koyukuk.

## MP 208.5

Highway Department checkpoint, manned 24 hours.

## MP 210

You are now at the base of the Chandalar Shelf. The source of the Chandalar River, which extends into Canada, is near here. The word "Chandalar" is believed to have derived from the French "gens de large," meaning, literally, "people at large," without a home — in other words, wanderers or nomads. The description may have been used by French-Canadian trappers to describe an aboriginal people living along the lower reaches of the river, in Canada. Later, apparently, the phrase's corrupted form became the name of the river itself.

## MP 246.3

The Continental Divide. Elevation 4,739 feet. Small streams — some the origins of great rivers — flow north or south from this divide, depending on the location of their highest sources in relation to the spine of the mountain range. To the east, you'll see a fine example of a cirque — an amphitheater-shaped bowl or depression, formed by eons of glaciation and erosion. This is the summit of Atigun Pass, highest point along the pipeline route. Many of the peaks visible from here are more than 7,000 feet high. There are spectacular geological formations nearby especially to the east of the road, where you can see the folded and faulted sedimentary rock of an ancient, eroded seabed of the Paleozoic Era — some three million years old.

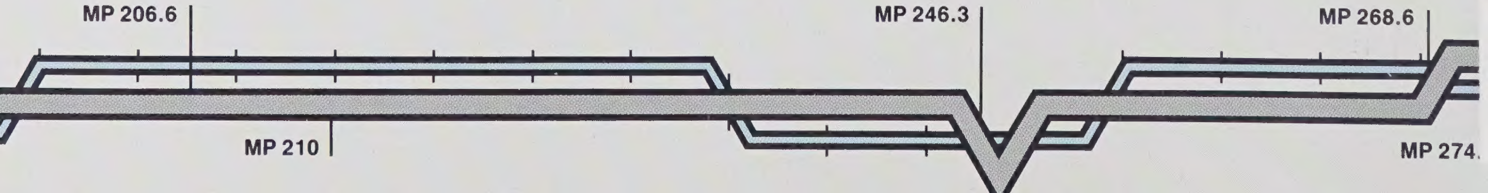
## MP 268.6

Pump Station 4, which is visible from here, has the highest elevation of all the pipeline pump stations — 2,760 feet. The aircraft-type turbine engines which drive the mainline pumps are fueled by natural gas, transported via small-diameter pipeline from the Prudhoe Bay field. Each mainline pump, powered by these 17,500-horsepower engines, can move 800,000 barrels of oil per day.

## MP 274.6

Galbraith Lake. The lake was named in 1951 for Bart Galbraith, a bush pilot who was lost while flying in this region. Archeological digs were conducted in the vicinity prior to pipeline construction by the University of Alaska, under contract to the pipeline company, to preserve historical materials. Hundreds of artifacts have been recovered from early Eskimo hunting camps. Every foot of the pipeline route was checked for the presence of artifacts, and approximately 330 sites were actually excavated.

As you travel along the pipeline route, you'll see both gate and check valves on the line. Check valves are designed to close automatically, should the line be shut down for any reason. Most of the gate valves can be closed by radio signal from the Control Center at the Marine Terminal. The valves control the flow of



oil in the line, and limit the amount of oil that might be spilled in the event of a break in the pipeline.

## MP 309

The broad plateau stretching ahead of you slopes gently downward about 125 miles to the Arctic Ocean, and is called the North Slope. The name was scarcely known beyond the immediate vicinity before the dramatic discovery of oil at Prudhoe Bay in 1968, but since has become almost a generic term applied to the area of arctic oil development in general.

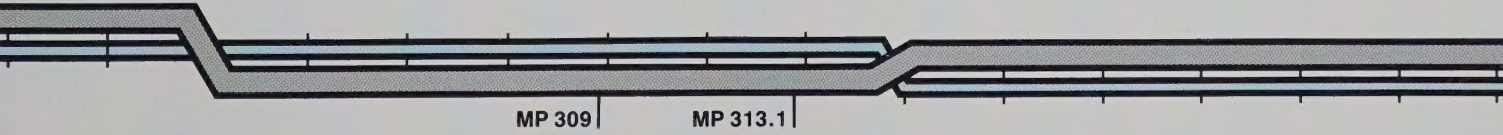
To the east of the Highway is the Sagavanirktok River, which flows north to the Arctic Ocean. This is a good example of a "braided" river, which spreads across a wide bed in many twisting, diverging, and rejoining channels. Such rivers may flood in the spring at breakup, when snows melt in the mountains, and move enormous amounts of gravel within the confines of their broad flood plains.

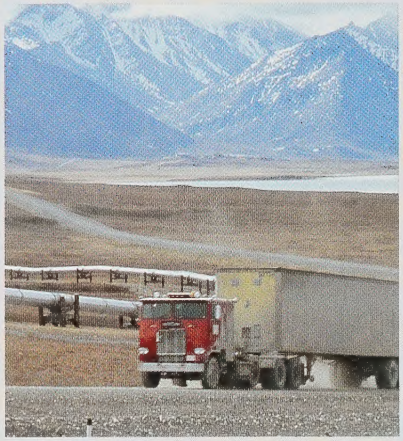
The Sagavanirktok supports several varieties of fish, including grayling and arctic char. It's interesting to note that grayling spawn only in streams entering the Sagavanirktok from the west, while arctic char spawn only in streams entering the river from the east. This phenomenon was discovered in the course of fisheries studies conducted in the area under contract to the pipeline company. The purpose of these studies was to develop construction timing and techniques that would avoid damage to the fish stocks. Both grayling and arctic char spend winters in the larger, deeper channels of the Sagavanirktok, where they find enough oxygen to survive during the long months the river is frozen over.

## MP 313.1

Pump Station 3. For all the complexity of its operation, a typical pump station like this one usually houses no more than 25 people. The crews work 12 hours a day, seven days a week, with every other week off. The work is hard, so the living quarters are comfortable, the food is excellent, and the pay is good.

Here the Highway generally follows the route of the pipeline, which is now in above-ground mode.





## MP 360

Where roads pass under the pipeline, "gates," or portals of steel pipe, have been erected spanning the road and on either side of the pipe. These are called "headache bars." The steel crosspieces at the top are just slightly lower in height than the pipeline, and are designed to serve as a warning to the drivers of large vehicles that might strike and damage the line.

## MP 361

Pump Station 2. This is the only mobile pump station on the pipeline route — that is, it can be moved from one site to another, should the need arise. Stations 1, 2, 3, 5, and 6 are in permafrost areas. To maintain the stability of the permanently-frozen soil, the ground under most pump station buildings is refrigerated. Coils of pipe for circulating a brine solution are buried in gravel beneath mats of plastic foam insulation, to keep the soil frozen and stable.

## MP 378.6

To the west is a good example of one of the many small hills, called pingos, which are visible on the North Slope. Pingos are "frost heaves," and may develop from the beds of evaporated lakes that have been covered with vegetation. Frost raises their surfaces from a few feet to several hundred feet above the surrounding terrain. Native hunters used pingos to overlook the countryside for game.

On the way to Prudhoe, the Highway crosses many rivers and streams. In wintertime, an interesting phenomenon called "aufeis" may develop in these areas. If a river freezes solid while water continues to flow from its source, the water is often forced to the surface of the ice. This water also freezes, layer upon layer, in sheets, forming aufeis. Aufeis can reach depths of 30 feet, and can spread over many square miles.

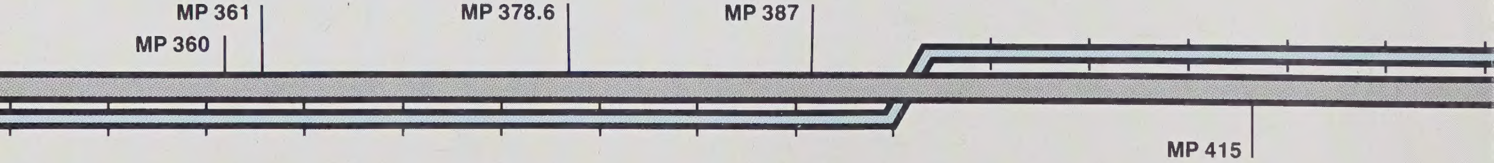
## MP 387

To the east are Franklin Bluffs, rising to an elevation of 830 feet. The Bluffs, located on the east bank of the Sagavanirktok River about 30 miles from Prudhoe Bay, were named after Sir John Franklin of the British Royal Navy, an early explorer in the area.

## MP 415

The end of the James Dalton Highway. A system of roads beyond this point accommodates traffic to structures associated with production of oil from the fields here. The waters of Prudhoe Bay and the coast of the Arctic Ocean are about seven miles north.

Prudhoe Bay was named by Sir John Franklin in 1828, apparently in honor of Algernon Percy, also of the Royal Navy, who had served with Franklin in other remote regions of the world. Percy was, at that time, first Baron Prudhoe, then pronounced to rhyme with "spud-hoe." Prudhoe is a small town in the County of Northumberland, in eastern England.



A drive over the James Dalton Highway affords many views of the trans Alaska pipeline, and in this booklet we have attempted to explain in general terms some of the features which are apparent.

For additional information, you may write to:

Public Affairs Department
Alyeska Pipeline Service Company
1835 South Bragaw St.
Anchorage, AK 99512

University of Alberta Library
0 1620 0338 4144

Alyeska pipeline
SERVICE COMPANY

May 1985